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Surface characterization of activated chalcopyrite particles via the FLSmidth ROL process. Part 1: Electron microscope investigations

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Because of its unique semiconductor properties, the world's most abundant copper mineral (chalcopyrite) is refractory with respect to atmospheric leaching using traditional ferric sulfate lixiviants. A novel approach to address this issue – conducted at FLSmidth – utilizes a mechanochemical Rapid Oxidative Leach (ROL) assisted by a Stirred Media Reactor (SMRt). Due to the elimination of much of the surface passivation problems associated with atmospheric leaching, this process is able to attain copper recoveries >97% in under 6 hours. An optional, rapid preconditioning step uses minute quantities of copper(II) to dope the semiconductor lattice and thereby "activate" the chalcopyrite, thereby reducing leach times below 2 hours (>98% recovery). Because the activation plays a major role in accelerating the leaching step, it is critical to understand the nature of this intermediate and its part in the ROL process. The current work presents results from electron microscope investigations of surface-activated particles.

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